

Establishing a Streamflow Standard for Rhode Island

StreamFlow Standard Goals:

- Allow for optimum use and encourage sound management practices
- Be ecologically sustainable
- Be flexible - provide a statewide standard while allowing for site-specific studies
- Not be influenced by current pumping
- Be simple to apply
- Be influenced by site-specific hydrologic factors

Current RI Flow Standards: Water Quality Regulations

- WQ standards provide water quality and quantity for the protection of the aquatic environment.
- Water Quality Regulations apply to activities that cause or contribute to flow alterations.
- Projects involving flow alterations require a Water Quality Certification.

Current RI Flow Standards: Freshwater Wetlands Regulations

- Freshwater Wetlands Regulations require approval for activities that may alter the flow into or out of freshwater wetlands.
- RIDEM must find that proposed projects will not result in a significant reduction in:
overall wildlife production and/or diversity,
suitability for use by wildlife species, or
water quality functions and values by
modifying or changing water elevations,
volumes, velocity of flow regimes, etc.

How have Current RI Flow Standards been Implemented?

- US Fish and Wildlife Service (USFWS) ABF method
 - Median of monthly means from historic records
 - or default values
 - 0.5 cfsm summer
 - 1.0 cfsm fall/winter
 - 4.0 cfsm spring
- Historic releases where critical fisheries were present
- Site-Specific based upon biologists assessment for minimum streamflow

New England Aquatic Base Flow

PROS

- Used by USF&W on FERC and Army Corps permits
- Incorporates temperature
- Has been defended in court
- Has a default flow for small streams
- Has seasonal considerations to mimic the natural flow regime(i.e.magnitude, frequency, timing, duration, rate of change)

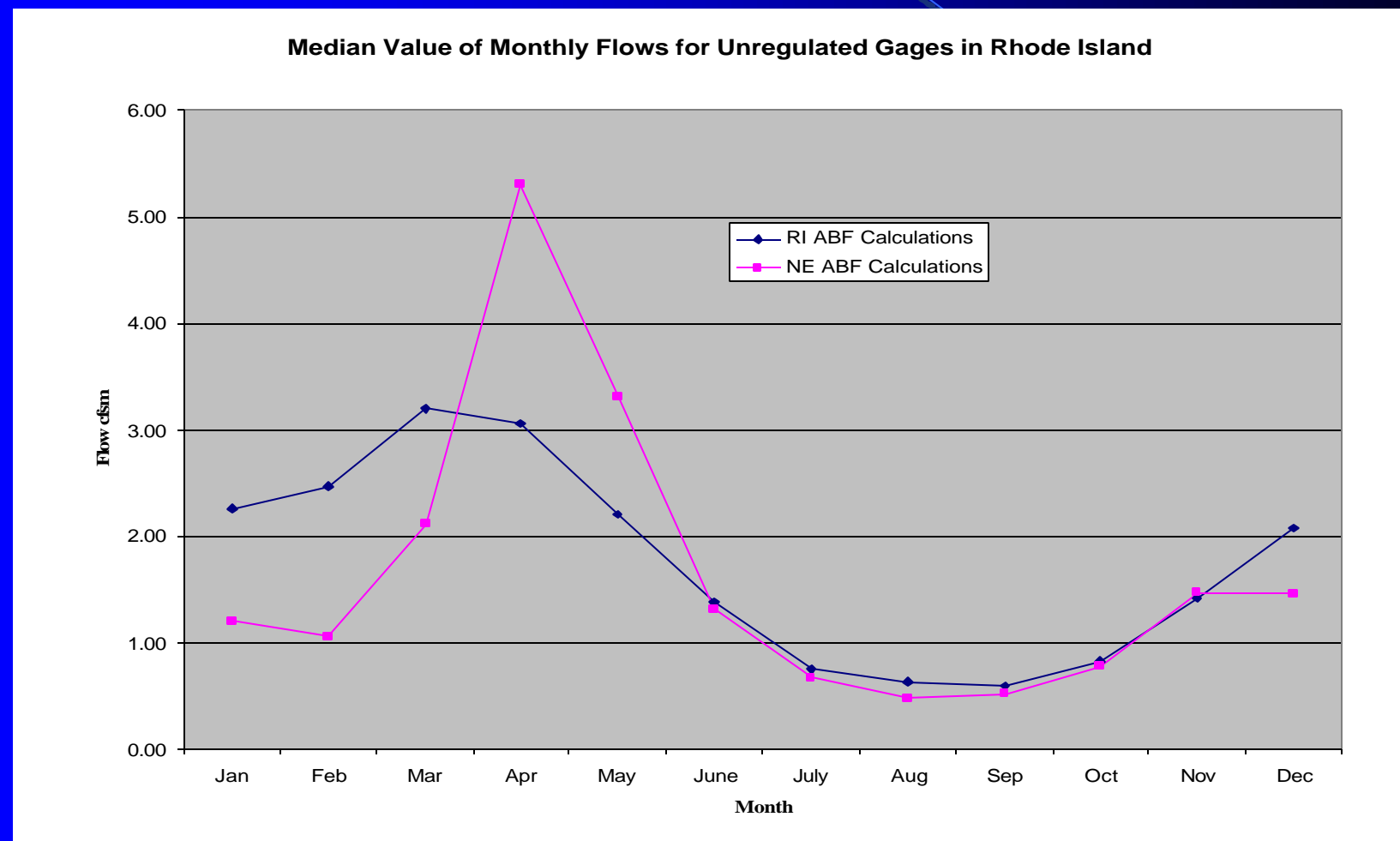
CONS

- Primarily designed for flow releases
- For 50sq. Mi or greater it requires unregulated long term gaging station
- Spring Default value is difficult to attain naturally in south-eastern New England where we do not have significant snow melt
- Difficult to apply to consumptive uses because flow is not naturally met for 1/2 of August and 1/2 of September

RI Proposed Modifications to USFWS ABF

- Use 14 RI gages
- Use statistics that better represents RI watersheds
- Use a monthly standard rather than three seasonal standards to better represent natural flow regime
- Adjust for physiographic regions
- Adjust for stratified drift and till

Comparison of ABF RI Gages vs NE Gages (USFWS)



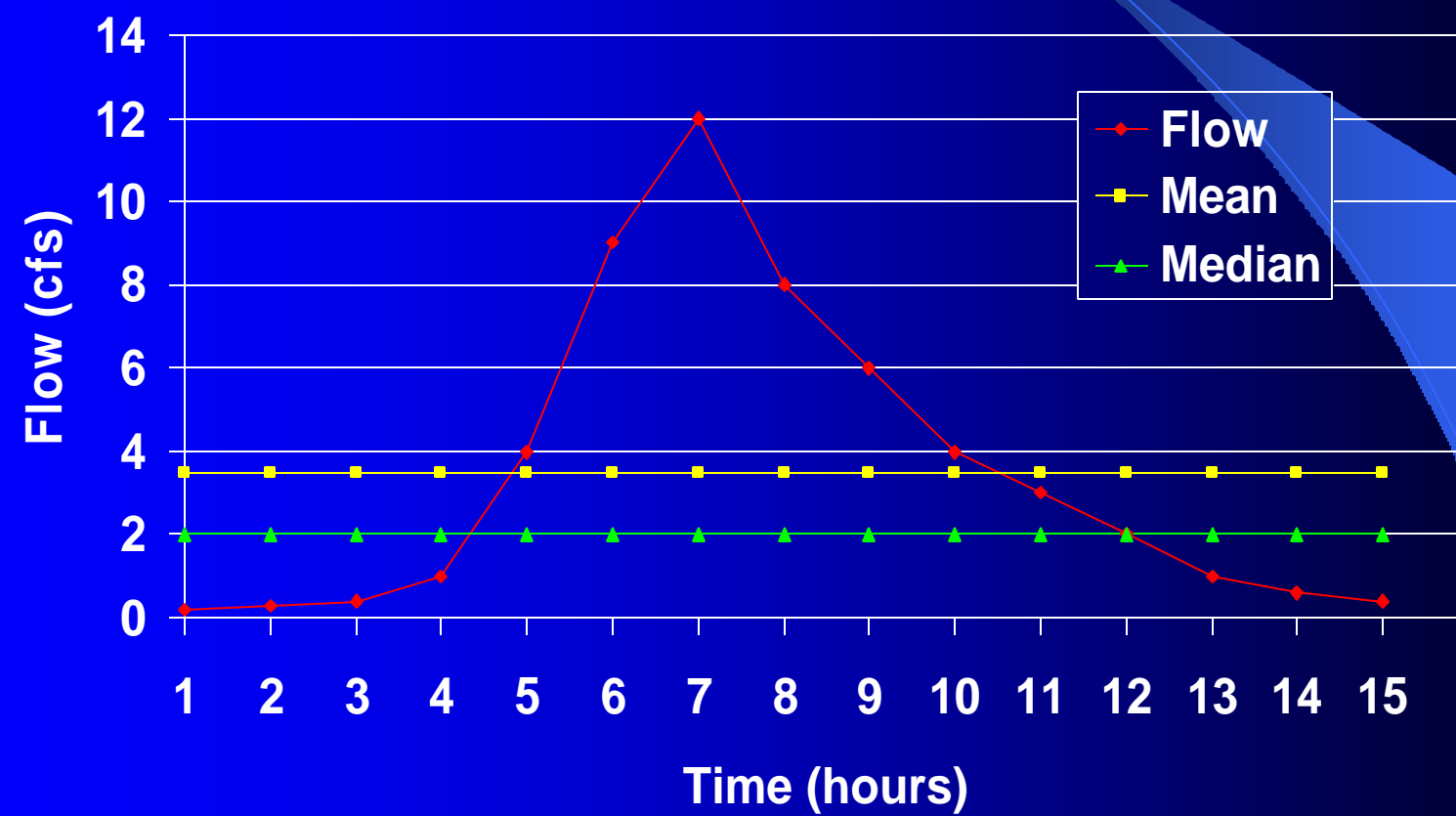
Modifications to USFWS Statistics

- Used RI gage data and calculated the median of the monthly medians rather than the median of the monthly means

Why?

- Median of monthly means can be skewed upward by large storms
- USFWS chose streams with large watersheds ($>50\text{mi}^2$) to ensure that a branching drainage pattern was included to smooth out the effects of localized storms and reduce flow variability
- The majority of the streams in RI have watersheds $< 50\text{ mi}^2$

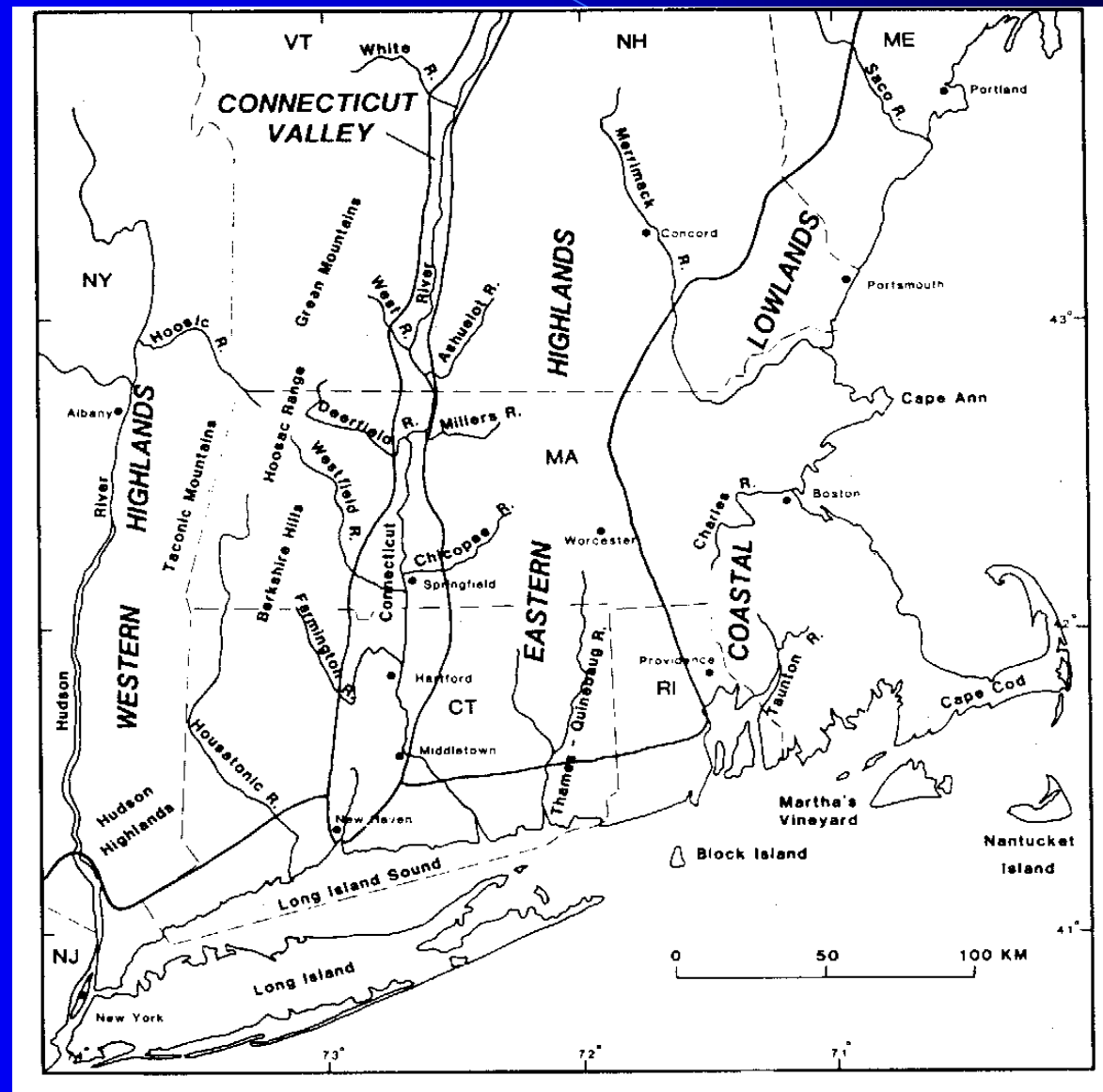
Can Be Skewed Upward by Large Storms



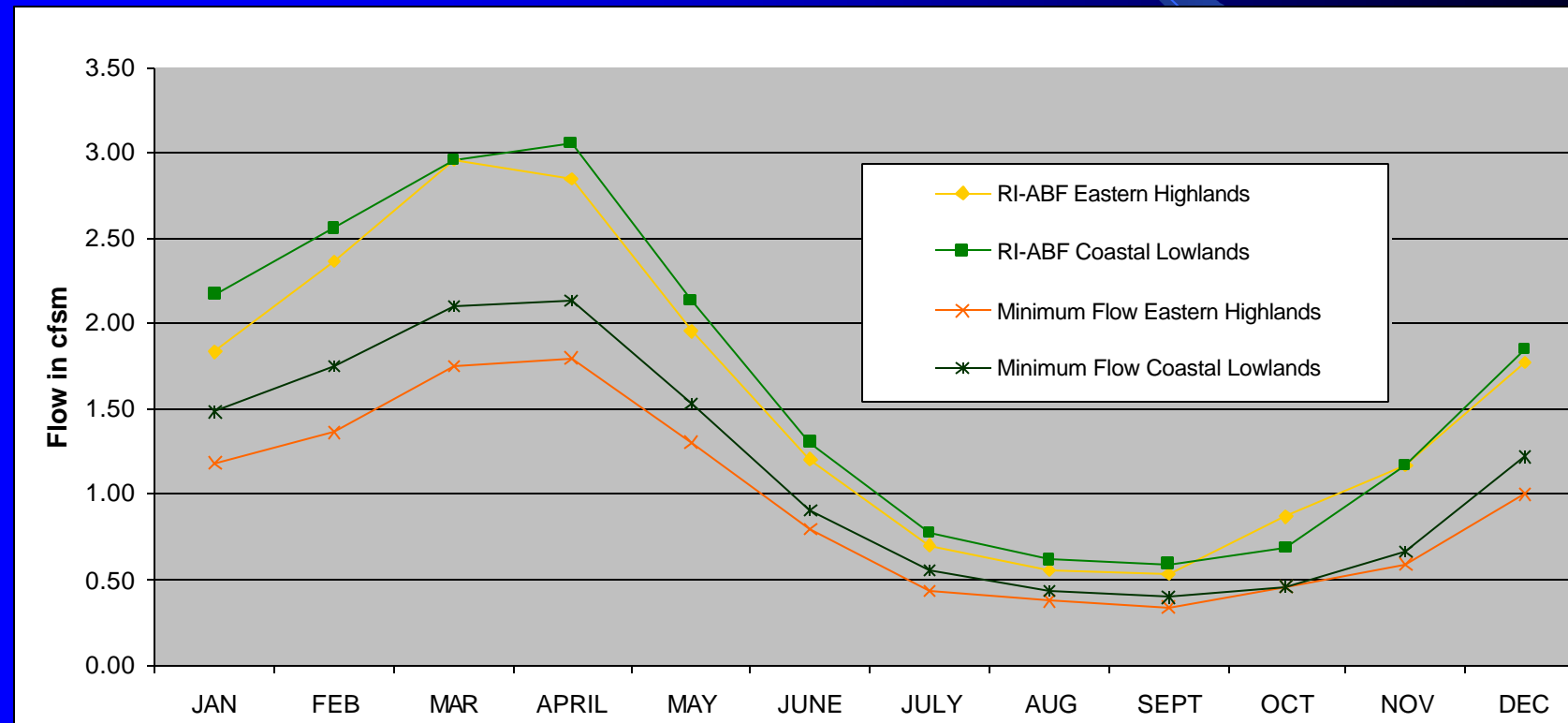
Physiographic Regions

- Studies from Patton, 1988, showed that RI has 2 distinct physiographic regions:
 - Eastern Highlands have shallow alluvial channels before reaching bedrock which yield lower quantities of water
 - Coastal Lowlands have deeper alluvial pockets which yield higher quantities of water

Where are they?



Rhode Island Proposed Instream Flow Standard



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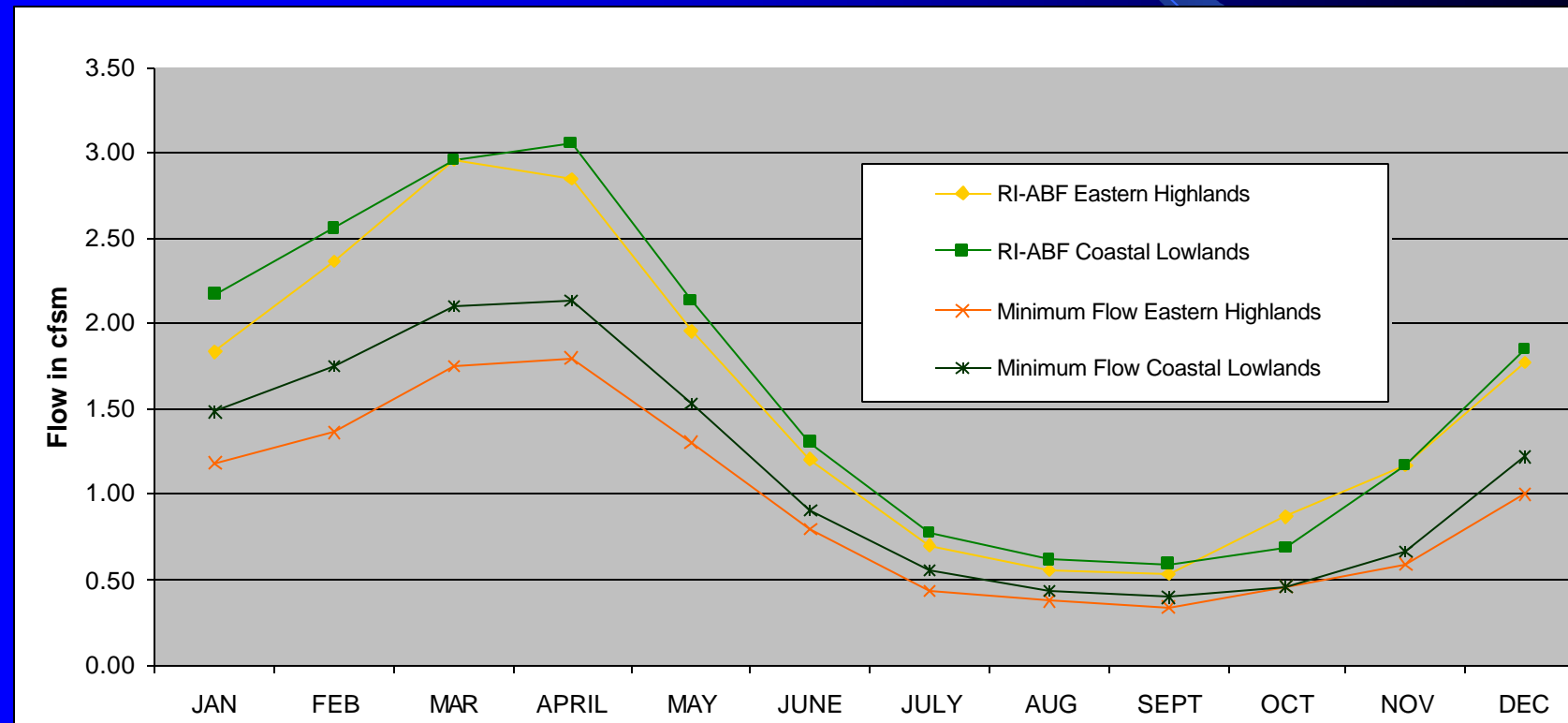
What Duration and Frequency are Acceptable

- EPA recognizes 4B3 flow as a biologically based flow that protects aquatic habitat from chronic toxicity
- 4 day flow(duration) that occurs once every 3 years(frequency)
 - excursions of stress every 3 years provides an appropriate period of time for aquatic community to recover and function normally until the next excursion
 - if the 4 day average level of a pollutant does not exceed the chronic level once every 3 years the aquatic habitat should not be adversely affected
- Low flows create stresses such as increased temperature and reduced dissolved oxygen

How can 4B3 flow be maintained?

- If the stream is allowed to reach the 4B3 level every year then the principle of the 4B3 is not met
- Therefore, a buffer is needed
- Modeling from the Ipswich River showed that once withdrawals are shut off, the river recovers and mimics a natural flow regime over time
- Using the 4B2 as a minimum should allow the 4B3 to be maintained

Rhode Island Proposed Instream Flow Standard



Proposed Instream Flow Standard for Rhode Island

- RI ABF flow
- Minimum flow of 4B2
- Site-specific evaluations as necessary